1,052,523

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,052,523

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Date of Application and filing Complete Specification: Feb. 26, 1964.

No. 7982/64.

Complete Specification Published: Dec. 21, 1966.

Index at acceptance:—G6 P5

Int. Cl.:—G 01 t

COMPLETE SPECIFICATION

Ionisation Chamber for Measuring Humidity

We, VEB VAKUTRONIK, a Corporation organised under the laws of Eastern Germany, of 14 Dornbluthstrasse, Dresden A 21, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Ionisation chambers are among the means used to detect neutrons which have been emitted by a fast neutron source and back-scattered in a substance. The powerful back-scattering property of hydrogen is utilised technically for humidity measurements, where the optimum geometrical arrangement of the neutron source with respect to the detector, and of both to the material to be measured, constitute an essential factor in determining the sensitivity of measurement.

It is known that, in order to obtain high sensitivity of measurement, the neutron source is disposed in immediate proximity to the detector, and this combination should be surrounded on all sides by the material to be measured. This geometrical correlation may be regarded as optimum, irrespective of the detector used. The known arrangements usually comprise one or a plurality of BF_3 proportional counter tubes, at the sides of which the neutron source is arranged. Proportional counter tubes have been chiefly used as detector because their response sensitivity to slow neutrons is high. The use of ionisation chambers for measuring humidity by means of neutrons has been abandoned chiefly because of its low sensitivity to slow neutrons. Only limited use can be made of the scintillation counter owing to the stability required of the electronic system.

An ionisation chamber for slow neutrons is further known which contains a plurality of boron layers one behind another as coaxial hollow cylinders or one upon another as plates in order to increase the responsiveness to slow neutrons. In some cases, the electrometer tube is also arranged in the chamber.

The disadvantage of the known arrangements resides in the fact that the optimum geometric correlation between source and detector and between measuring probe and material to be measured is uneconomic to obtain, and that the arrangements suffer from instability and unreliability of operation. If a plurality of counter tubes are disposed axially about the source, then the source/detector geometry is improved, but owing to the increased diameter of the entire arrangement, the sensitivity of measurement is reduced. The measuring probe/measurement material correlation in this case must necessarily be imperfect. Apart from the additional outlay of proportional counter tubes, this is necessarily accompanied by a high incidence of faults. The use of a plurality of ionisation chambers is excluded for the same reason.

The disadvantages of using a scintillation counter are to be found substantially in the fact that very high demands must be made of the electronic system owing to unfavourable scintillator properties as regards characteristic, gamma sensitivity etc. The industrial use of the scintillation counter for measuring humidity has not hitherto proved successful.

It is the aim of the invention to obviate the disadvantages of known source/detector arrangements for measuring humidity by means of neutrons, without at the same time being compelled to accept a deterioration in the correlation between measuring probe and material to be measured.

It is the underlying aim of the invention to achieve an optimum geometrical correlation between source and detector and between both the latter and the material to be measured, whilst it is intended to use an operationally reliable detector which can be operated by an electronic system which has already been used and tried for a variety of industrial purposes.

[*Price 4s 6d.*]

claim 1 or 2, wherein the slow-neutron sensitive chamber is of cylindrical shape and the source of fast neutrons is partly or totally surrounded by the said chamber.

4. An ionisation chamber as claimed in claim 1, 2 or 3 wherein the ionisation chamber is of cylindrical construction and is used for measuring one humidity of bulk materials.

5. An ionisation chamber as claimed in claims 1, 2 or 3 wherein the ionisation chamber is of disc-shaped construction and is used for surface humidity measurement.

6. An ionisation chamber as claimed in any one of claims 1 to 5, wherein the slow-neutron sensitive chamber is surrounded by a neutron-reflecting shield.

7. An ionisation cramber as claimed in any one of claims 1 to 6, wherein the slow-neutron sensitive chamber contains the electrodes.

8. An ionisation chamber substantially as described with reference to and as illustrated in the accompnaying drawings.

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31/32 Bedford Street,
Strand, London, W.C.2.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1966. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

1052523 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 1 & 2

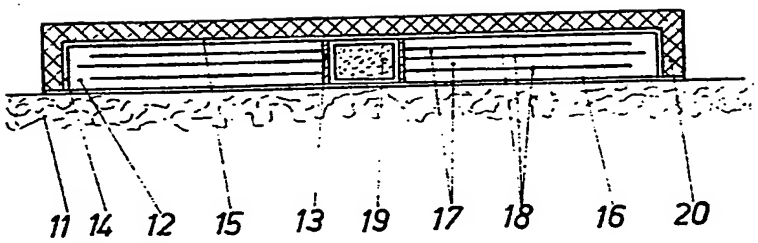

Fig. 2